EXHIBIT O

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF INDIANA
SOUTH BEND DIVISION

In re: BIOMET M2A MAGNUM HIP IMPLANT PRODUCTS LIABILITY LITIGATION (MDL 2391)	)))))	CAUSE NO. 3:12-md-2391

This Document Relates to: All Cases

GENERIC EXPERT REPORT OF
FRANCIS H. GANNON, M.D.

Dated: February 23, 2017

GENERIC EXPERT REPORT OF FRANCIS H. GANNON, M.D.

1. **Statement of opinions to be rendered**:

The principal opinions I have reached based upon the work referenced herein can be summarized as follows:

a. Wear debris from metal on metal hip implants is released into the tissue environment of the synovial tissue and surrounding capsule. This wear debris is ingested by macrophages recruited to the local environment. The metal wear debris ingestion leads to localized cellular death and significant scarring. This necrosis is directly associated with the metal laden macrophages and not the lymphocytes or blood vessels noted in other areas of the tissue. These morphologic and physiologic changes frequently lead to clinical symptoms or findings necessitating joint replacement, often with concurrent and additional pain and suffering.

b. It is generally understood in the orthopedic community, and it is also my opinion, that patients with metal on metal hip implants are at a significantly increased risk of developing an adverse soft tissue response in peri-prosthetic tissue, than are patients who have either a ceramic on polyethylene or metal on polyethylene hip implant. This response often results in pain in the peri-prostheic tissue, tissue necrosis, chronic inflammation, audible or sensory mechanical issues, fracture, dislocation, increased clinical visits and revision surgery. Patients also sometimes develop fluid masses in these damaged tissues that can often be seen at the time of surgery and can frequently be seen on radiologic or magnetic resonance imaging exams. In addition, patients who have metal on metal hip implants are at an increased risk of developing infections late in their course and those infections are different from those occurring around the time of surgery. These clinical manifestations can be better understood in light of the morphologic features noted in tissue sections.

c. The complications now frequently seen in patients with metal on metal implants, which are described in my report, were recognized as potential risks in the late 1990s, well before Biomet's metal on metal hip implants became available to surgeons and patients in the United States. There were significant scientific questions about the data available at that time suggesting that the clinical sequelae described in my report might arise, which they did. The potential risks acknowledged before Biomet introduced its metal on metal hip implants included cellular cytoxicity and activation of the immune system both directly and indirectly, both of which contribute to the clinical symptoms and biological processes described in my report.

d. The opinions discussed herein are expressed in terms of reasonable medical probability, and are based on my education, training, and clinical experience. I have also considered the materials in the list attached as Exhibit A to this report in formulating my opinions.

2. **Technical discussion**:

Synovial Tissue

Normal synovial tissue lines the joint spaces of synovial joints and synthesizes hyaluronic acid and various proteins contained in synovial fluid. Synovial membranes are lined by synoviocytes, cuboidal connective cells that are arranged from one to four cell layers thick. They are undergirded by small vessels to aid in quick exchange of blood and synovial fluid. A thin layer of adipose tissue forms the base of the overall tissue.

Necrosis

Necrosis is the result of denaturation of intracellular proteins and enzymatic digestion of lethally injured cells. There are four main categories of necrosis but for the purposes of this report the discussion will center around coagulative necrosis, which is a form of necrosis where the architecture of dead tissue is preserved and the outlines of the cells can still be observed but without nuclei or cellular organelles. As necrotic cells rupture they spew their contents into the extracellular environment resulting in an amorphous pattern of debris, and often pressurized zones of fluid-like matter.

Inflammation

Inflammation is generally described as recruitment of white cells to a site of injury. Inflammation is classified as acute and chronic, with acute inflammation generally consisting of neutrophils and occasionally eosinophils and basophils (needed for the secretion of vasoactive amines). Chronic inflammation consists of the mononuclear white blood cells, including lymphocytes, plasma cells, and monocytes. Chronic inflammation can be a transformation of acute inflammation, reaction to viruses or reaction to persistent insults, such as wear debris. However, the cross-over between the innate and adaptive immune system is a web, rather than a linear progression, and neutrophils and other cells may also be seen in the affected areas.

Macrophages

Macrophages are a type of white blood cell involved in inflammatory conditions and have complicated functions and responses in disease states. One of the primary functions of macrophages is to phagocytize foreign material. In the case of metal wear debris, the macrophage cells are unable to digest the debris and are further damaged by the debris, which can lead to the secretion of chemokines, necrotic cell death, or both. Macrophages are involved in the local tissue reaction, and also participating in signaling and recruiting other inflammatory cells to the local environment.

Additionally, macrophages form a large part of the innate immune system in protecting against infections. The macrophages not only engulf or phagocytise the offending agents but they serve as powerful mediators of both the complement associated destruction and in the

recruitment of neutrophils and other white blood cells as a first line of defense against pathogens.

Given the amount of macrophages present with engulfed metal-on-metal debris, there may be a significant reduction of macrophages available for the innate immune system in these locations leading to increased chances for infection. With the apoptosis and necrotic pathways of cellular destruction being present in these affected areas there may also be significant interference in the cytokine and chemokine profiles necessary for normal immune defenses.

Additionally, the necrosis that is associated with these metal-laden macrophages may serve as an anoxic or hypoxic environment suitable for the growth of pathogens.

Hypersensitivity reactions

Hypersensitivity reactions refer to a class of reactions to an antigen to which an individual has previously been sensitized. An antigen is a substance that when introduced into the body stimulates the production of an antibody. Antigens typically include bacteria, foreign cells, venoms, foods, viruses and parasites. Occasionally, repeated exposure to these substances can trigger a pathologic response and these responses are described as hypersensitivity, implying an excessive response to an antigen.

These reactions can be varied and have been generally classified into four categories: 1) Immediate (Type I) hypersensitivity, 2) Antibody-mediated (Type II) hypersensitivity, 3) Immune complex-mediated (Type III) hypersensitivity, and 4) Cell-mediated (Type IV) hypersensitivity.

Immediate (Type I) hypersensitivity is a rapid immunologic reaction that usually occurs within minutes of exposure to the offending agent. In these situations, the antigen is complexed with an antibody and then bound to mast cells resulting in the release of vasodilatory mediators and pro-inflammatory cytokines. The clinical changes become evident within 5-30 minutes.

Antibody (Type II) hypersensitivity results from the binding of antibodies to normal or altered cell surface antigens. The antigenic stimuli may be intrinsic to the cell or take the form of exogenous antigen that is adsorbed onto the cell surface. This results in the destruction of the cell by the immune system by the formation of membrane attack complexes.

Immune complex-mediated (Type III) hypersensitivity causes the tissue damage at the site of deposition by eliciting an inflammatory response that attacks the tissue involved. In this type of reaction, the protein that is introduced triggers an immune response with the production of the protein. The antigen-antibody complexes are then deposited in various tissues. Once deposition has occurred, then an acute inflammatory stage is enacted that usually occurs before the beginning of the second week after protein injection. Destruction of the local tissue then ensues.

T cell-mediated (Type IV) hypersensitivity is initiated by antigen-activated T lymphocytes and were originally characterized as delayed-type hypersensitivity reactions to exogenously administered antigens. These activated T-cells engender a cell mediated toxicity with associated apoptosis. The apoptotic cell death is mediated directly from the adjacent T lymphocytes and does not normally result in large areas of cell death. The response in patients with metal-on-metal hip implants is thought to be mediated by haptens engendering a cell mediated response. A hapten, in this case, is a metal-protein complex that is immunogenic with resultant damage in association with the cytotoxic effects of the metal wear debris present in the peri-prosthetic tissues and elsewhere.

In the disease listed above, as well as conditions such as latex allergies and the like, the pathology shows T cells admixed with acute inflammation. The cell mediated death in cases of Type IV hypersensitivity is largely apoptotic in nature rather than large areas of necrotic cell death. Additionally, the perivascular lymphocytes noted in these patients are usually located separate from the macrophages and the necrosis, in most cases. The large areas of necrosis are related to the metal-laden macrophages and this is consistent with the toxic nature of cobalt and chromium. The process in patients with exposure to metal debris is distinct and different than processes observed in patients with hypersensitivity.

The pathology in these patients differs from that seen in T cell mediated (Type IV) hypersensitivity, although these commonly noted morphologic features could be thought of as a response similar to a Type IV hypersensitivity.

Qualifications:

A current copy of my curriculum vitae is attached to this report as Exhibit B.

I graduated from LaSalle University in Philadelphia, Pennsylvania in 1986 with a degree in biology. I then attended medical school at Jefferson Medical College in Philadelphia, graduating in 1991. I completed a residency in Pathology and Laboratory Medicine at Thomas Jefferson University Hospital in Philadelphia in 1994. I am Board Certified in Anatomic Pathology from the American Board of Pathology.

I spent 8 years at the Armed Forces Institute of Pathology where I was part of the Orthopedic Pathology branch. For two years, I served as Chairman of that branch.

I am currently a Professor of Pathology and Orthopedic Surgery at Baylor College of Medicine in Houston, Texas. I am the Residency and Fellowship Program Director for the Department of Pathology at Baylor College of Medicine. I am a staff pathologist in the Departments of Pathology at Texas Children's Hospital, Ben Taub General Hospital, and Debakey VA Medical Center, all in Houston. I also serve as a Veterans Affairs National Bone Pathology Consultant.

At Baylor College of Medicine, I serve as Chair of the O'Neal/Spiut Award Committee, and as a member of the Institutional Review Committee. I also serve on the Baylor College of

Medicine Curriculum Committee as chair. In addition, I serve as a member of the Biorepository Steering Committee of the College of American Pathologists.

I serve as a reviewer for the following journals: *Clinical Orthopedics and Related Research*, *Head and Neck Pathology*, *Skeletal Radiology*, and *Ear, Nose and Throat Journal*.

I am a member of the International Academy of Pathologists, the International Skeletal Society (where I serve on the Executive Committee), the Texas Society of Pathologists, the Houston Society of Pathologists, and the International Fibrodysplasia Ossificans Progressiva Association.

As a practicing pathologist with a specialty in Orthopedic Pathology, I have examined several hundred joint replacement pathology specimens including for frozen section interpretation. In addition, in my 20+ years of practice I have examined thousands of surgical pathology and autopsy pathology specimens. Each of these has informed my ability to interpret various forms of necrosis, tumors, inflammatory conditions and many other conditions. This experience is transferrable to all pathology specimens and allows me the expertise to interpret all forms of gross pathologies, no matter the organ being viewed.

3. Previous testimony:

Within the last 4 years, I have either been deposed or testified in the following matters:

Kauthen v. DePuy, Fifteenth Judicial Circuit, West Palm Beach Florida, CASE NO. 50-11-CA-004158; July 19, 2013

Herlihy-Paoli v. DePuy, MDL 2244; Case No. 12-cv-4975; March 31, 2014

Lay v. DePuy, MDL 2244; Case No. 11-cv-3590; March 31, 2014

Reese v. Sateri, Baltimore, Maryland County Case No. 06-C-12-062717

Hodges v. DePuy, MDL 2244; Case No. 12-cv-2695; July 9, 2014

Rowe v. DePuy, MDL 2244; Case No. 12-cv-4354; July 9, 2014

4. Compensation:

My billing rate is $500 per hour.

I reserve the right to supplement this report if further data, documents, or information becomes available, or to correct this report if errors are discovered. I may use visual aids or demonstrative exhibits, such as diagrams, images, slides or charts that help illustrate or explain my opinions.

Dated: February 23, 2017

Francis H Gannon, M.D.

Attachments:

Exhibit A: List of materials considered

Exhibit B: Curriculum vitae

EXHIBIT A
MATERIALS CONSIDERED

Literature:

Abdullah, K.A. *Stress and Stability Analysis of the Neck-stem Interface of the Modular Hip Prosthesis*. Queen's University, Canada. (1998).

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ASTM Standard F2580, 2013, "Standard Practice for Evaluation of Modular Connection of Proximally Fixed Femoral Hip Prosthesis", ASTM International, West Conshohocken, PA, 2012, DOI: 10.1520/F2580-13, www.astm.org.

ASTM Standard F75, 2012, "Standard Specification for Cobalt-28 Chromium-6 Molybdenum Alloy Castings and Casting Alloy for Surgical Implants", ASTM International, West Conshohocken, PA, 2012, DOI: 10.1520/F0075-12, www.astm.org.

ASTM Standard F732, 2011, "Standard Test Method for Wear Testing of Polymeric Materials Used in Total Joint Prostheses", ASTM International, West Conshohocken, PA, 2011, DOI: 10.1520/F0732-00R11, www.astm.org.

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Zimmermann, J. and Ciacchi, L. "Origin of the selective Cr oxidation in CoCr alloy surfaces." *J. Phys. Chem. Lett.* 1.15 (2010): 2343-2348.

Other materials:

Videotaped Deposition of James Lancaster in MDL 2391 (September 8, 2016) and exhibits thereto.

Videotaped Deposition of David Schroeder in MDL 2391 (September 21, 2016) and exhibits thereto.

EXHIBIT B
CURRICULUM VITAE

CURRICULUM VITAE
FRANCIS H. GANNON

(281) 386-6909 -- cell

Texas Medical License: #M3554
Pennsylvania License: #MD-051870-L
District of Columbia License: MD30965
Birthday: November 20, 1963

(713) 798-4340 -- work

fgannon@bcm.tmc.edu-- E-mail

EDUCATION

- Jefferson Medical College
  Philadelphia, PA
  1986-1991, School of Medicine
  M.D. Degree

- LaSalle University
  Phila., PA 19242
  1982-1986, Biology
  B.S. Degree

GRADUATE HOSPITAL CLINICAL EXPERIENCE

- Thomas Jefferson University Hospital
  Phila., PA 19107
  1991-1994, Residency
  Pathology and Laboratory Medicine

  - Thomas Jefferson University Hospital
    Fellowship
    Phila., PA 19107
    1988-1989, Post-Sophomore
    Pathology

BOARD CERTIFICATION

- American Board of Pathology
  Anatomic Pathology
  June, 1995

WORK EXPERIENCE

2015-present	Staff pathologist, Baylor St Luke's Hospital
2014-present	Vice-chair, Curriculum Committee, Baylor College of Medicine
2011-present	Professor of Pathology and Orthopedic Surgery Baylor College of Medicine Houston Tx
2009-present	Block director, First Year Medical Student Pathology Course, Baylor College of Medicine
2007-Present	Veterans Affair National Bone Pathology Consultant
2007-2013	Module director, Hard and Soft tissue module, Second Year Medical Student Fall Course, Baylor College of Medicine
2007-2014	Residency and Fellowship Program Director, Department of Pathology, Baylor College of Medicine, Houston Tx
2006-present	Staff pathologist, Department of Pathology, Texas Children's Hospital, Houston, Tx
2006-present	Staff pathologist, Department of Pathology, Ben Taub General Hospital, Houston Tx

2006-present	Staff pathologist, Department of Pathology, Debakey VA Medical Center, Houston Tx
2006-2010	Associate Professor of Pathology and Orthopedic Surgery Baylor College of Medicine Houston Tx
2004-2006	Chairman, Department of Orthopedic Pathology, AFIP
2001-2006	Chairman, Armed Forces Institute of Pathology, Department of Repository and Research Services
1998-2006	Armed Forces Institute of Pathology, Staff Pathologist, Department of Orthopedic Pathology, Washington D.C.
1999-2005	Assistant Professor of Pathology, Uniformed Services University of the Health Sciences, Edward Hebert School of Medicine, Bethesda Maryland
1994-1998	University of Pennsylvania School of Medicine, Assistant Professor of Orthopedic Surgery, Department of Orthopedic Surgery.
1994-1998	University of Pennsylvania School of Medicine, Assistant Professor of Pathology, Department of Pathology
1993-1994	Jefferson Medical College, Instructor in Pathology, Department of Pathology

COMMITTEES

2014-2016	Vice-chair, Curriculum Committee, Baylor College of Medicine
2013-Present	Promotions committee, Department of Pathology&Immunology, Baylor College of Medicine
2013-2104	Executive Committee member, International Skeletal Society
2010-2011	Chair, Pathology course steering committee, International Skeletal Society
2010-Present	Member, Medical Student Promotions Committee, Baylor College of Medicine
2010-Present Medicine	Chair, O'Neal/Spjut Award committee, Dept. of Pathology&Immunology, Baylor College of
2009-2010	Member, Pathology course steering committee, International Skeletal Society
2009-2103	Dean's Resource and Manpower Allocation committee, Baylor College of Medicine
2009-Present	Fall 1 Pathology Director, Baylor College of Medicine
2009-2012	Institutional Review Committee, Baylor College of Medicine
2009-2013	Finance Sub-committee, Graduate Medical Education Committee, Baylor College of Medicine
2008-2014 Texas	Graduate Medical Education Committee, Harris County's Medical Examiner's Office, Houston,
2008-Present	Baylor College of Medicine Curriculum Committee
2007-2014	Biorepository steering committee, College of American Pathologists

2007-2014	Graduate Medical Education Committee, Baylor College of Medicine
2007	Chair, Anatomy Task Force, Baylor College of Medicine
2007-2014	Chair, Residency Committee, Department of Pathology, Baylor College of Medicine

SOCIETY MEMBERSHIPS AND EDITORIAL REVIEW POSITIONS

2009-present	Reviewer, Head and Neck Pathology
2009-present	Reviewer, Ear, Nose and Throat Journal
2006-present	Texas Society of Pathologists
2006-present	Houston Society of Pathologists
2006-present	Reviewer, Skeletal Radiology
2005-present	International Skeletal Society
1995-Present	Reviewer, *Clinical Orthopedics and Related Research*
1994-2013	American Society for Bone and Mineral Research
1994-Present	International Fibrodysplasia Ossificans Progressiva Association
1991-Present	Member, International Academy of Pathologists

LECTURES:

Aug 1994	"Fibrodysplasia Ossificans Progressiva," Merck, Sharpe and Dohme, City, PA.
Sept 1994	"Giant cell tumor in the spine," Orthopedic, Radiology, and Pathology Society, Philadelphia, PA
Jan 1995	"Chondrosarcoma of the humerus," Orthopedic, Radiology, and Pathology Society, Philadelphia, PA
Aug 1995	"Ossifying lipoma in the femur," Orthopedic, Radiology, and Pathology Society, Philadelphia, PA
Oct 1995	"The histopathology of Fibrodysplasia Ossificans Progressiva," The Second International Symposium on Fibrodysplasia Ossificans Progressiva, Philadelphia, PA
April 1996	"Bone Pathology," Department of Pathology, Thomas Jefferson University Hospital, Philadelphia, PA
May 1996	"Hot topics in Bone Pathology: a bone pathologists perspective," University of Pennsylvania, Philadelphia, PA
Nov 1996	"Bone Pathology," Department of Pathology, Thomas Jefferson University Hospital, Philadelphia, PA
Oct 1999	"Fibrodysplasia Ossificans Progressiva: Why do some people have two skeletons?" Johns Hopkins University Hospital, Baltimore, MD

Jan 2000	"Fibrodysplasia Ossificans Progressiva: Why do some people have two skeletons?" USUHS Medical School, Washington DC
Nov 2000	"The histopathology of FOP" The Third International FOP Symposium, Philadelphia, PA.
Aug 2001	"The histopathology of FOP" Baylor College of Medicine, Houston, Texas
Nov 2003:	"Fibrodysplasia Ossificans Progressiva: Why do some people have two skeletons?" The 12th Annual Koppisch Lecture, San Juan Puerto Rico
Feb 2005:	"Cartilage lesions" University of San Carlos in Guatemala
Oct 2005	Bone Tumors, Washington Orthopedic Review, Washington DC—18 lectures
Sept 2006:	Fibrous lesions of bone, International Skeletal Society, Vancouver, Canada
Oct 2006	Washington Orthopedic Review, Washington DC—18 lectures
Oct 2006	Bone and Soft tissue Pathology, Baylor College of Medicine, School of Medicine—3 lectures
Aug 2007	Bone and Cartilage Regeneration, Orthopedic Surgery Dept., Baylor College of Medicine
Sept 2007:	Fibrous lesions of bone, International Skeletal Society, Budapest, Hungary
Sept 2007	Bone Pathology, Department of Pathology, Baylor College of Medicine—3 lectures
Oct 2007	Washington Orthopedic Review, Washington DC—18 lectures
Oct 2007	Bone and Soft tissue Pathology, Baylor College of Medicine, School of Medicine—3 lectures
July 2008	Pathology, College of Allied Health, Baylor College of Medicine—3 lectures
Aug 2008	Bone and Cartilage Regeneration, Orthopedic Surgery Dept., Baylor College of Medicine
Sept 2008	Washington Orthopedic Review, Washington DC—18 lectures
Oct 2008:	Fibrous lesions of bone, International Skeletal Society, Dehli, India
Oct 2008	Bone and Soft tissue Pathology, Baylor College of Medicine, School of Medicine—3 lectures
Jan 2009	Molecular biology of Heterotopic ossification, Orthopedic Surgery Grand Rounds, Walter Reed Army Medical Center, Washington DC
July 2009	Bone Pathology, Department of Pathology, Baylor College of Medicine—4 lectures
Sept 2009	Histopathology of stress reactions in Bone, International Skeletal Society, Washington DC
Sept 2009	Bone Pathology, Department of Orthopedic Surgery, Baylor College of Medicine—8 lectures
Oct 2009	Washington Orthopedic Review, Washington DC—18 lectures
Oct 2009	Histology Laboratory, School of Medicine, Baylor College of Medicine—9 lectures
Dec 2009	Bone Pathology Introduction, Hospital of the University of Pennsylvania, Dept of Pathology

Dec 2009	Bone pathology unknown sessions I and II, Hospital of the University of Pennsylvania, Dept of Pathology
Jan 2010	Introduction to Pathology, School of Medicine, Baylor College of Medicine—30 lecture hours
August 2010	Future directions for residency training, Pathology&Immunology Grand Rounds, Baylor College of Medicine
September 2010	Chondroblastic Osteosarcoma in the sacrum, International Skeletal Society, Athens, Greece
September 2010	Moderator, Sarcomas , International Skeletal Society, Athens, Greece
September 2010	Pathology muscle injury: Mimickers and Myositis Ossificans, International Skeletal Society, Athens, Greece
September 2010	Moderator, Molecular genetics and imaging of musculoskeletal disease: End or dawn of a new era, International Skeletal Society, Athens, Greece
Oct 2010	Washington Orthopedic Review, Washington DC—18 lectures
Jan 2010	Introduction to Pathology, School of Medicine, Baylor College of Medicine—30 lecture hours
Sept 2011	Moderator, Cartilaginous lesions, San Diego, CA, International Skeletal Society.
Oct 2011	Washington Orthopedic Review, Washington DC—18 lectures
Jan 2012	Jan 2010Introduction to Pathology, School of Medicine, Baylor College of Medicine—30 lecture hours
Oct 2012	Washington Orthopedic Review, Washington DC—18 lectures
Jan 2013	Jan 2010Introduction to Pathology, School of Medicine, Baylor College of Medicine—30 lecture hours
Oct 2013	Washington Orthopedic Review, Washington DC—18 lectures
Jan 2014	Jan 2010Introduction to Pathology, School of Medicine, Baylor College of Medicine—30 lecture hours
Oct 2014	Washington Orthopedic Review, Washington DC—18 lectures

Original Papers:

1. Miettinen M, Gannon FH, Lackman R. Chordomalike soft tissue sarcoma in the leg: A light and electron microscopic and immunohistochemical study. Ultrastruct Pathol 1992;16:577-586.

2. Kuo JS, Fallon MF, Gannon FH, Goldman D, Schumacher HR, Haddad JG, Kaplan FS. The articular manifestations of Paget's disease of bone. Clin Ortho Rel Res 1992;285:250-54.

3. Kaplan FS, Tabas JA, Gannon FH, Finkel GC, Zasloff M. The histopathology of Fibrodysplasia Ossificans Progressiva: An endochondral process. J Bone Joint Surg 1993;75A(2):220-30.

4. Marion M, Gannon FH, Fallon MD, Mennuti MT, Lodato RF, Kaplan FS. Skeletal dysplasia in perinatal lethal osteogenesis imperfecta. Clin Orth Rel Res 1993;293:327-37.

5. Kaplan FS, August CS, Fallon MD, Gannon FH, Haddad JG. Osteopetrorickets: The paradox of plenty. Clin Orth Rel Res 1993;294:64-78.

6. Tabas JA, Zasloff M, Fallon MD, Gannon FH, Cohen RB, Kaplan FS. Enchondroma in a patient with fibrodysplasia ossificans progressiva. Clin Orth Rel Res 1993;294:277-80.

7. Kaplan FS, Craver R, MacEwen D, Gannon FH, Finkel GC, Hahn G, Tabas JA, Zasloff M. Progressive osseous heteroplasia: A disorder of mesenchymal differentiation. J Bone Joint Surg 1994; 76A(3):425-36.

8. Schweitzer ME, Levine C, Mitchell DG, Gannon FH, Gomella LG. Bull's-eyes and halos: Useful MR discriminators of osseous metastases. Radiology 1993;188:249-52.

9. Junge RE, Mehren KG, Meehan TP, Crawshaw GJ, Duncan MC, Gilula L, Gannon FH, Finkel GC, Whyte MP. Familial periarticular hyperostosis and renal disease in black lemurs (eulemur macaco macaco). J Am Vet Med Assoc 1994;205:1024-9.

10. Kelepouris N, Harper KD, Attie MF, Fallon MD, Gannon FH, Kaplan FS, Haddad JG. Idiopathic, severe osteoporosis in men. Ann Intern Med 1995;123:452-60.

11. Yu JC, Bartlett SP, Goldberg DS, Gannon FH, Hunter JH, Habecker P, Whitaker LA. An experimental study of craniofacial growth on the long-term positional stability of microfixation. J Craniofacial Surg 1996;7:64-8.

12. Schweitzer MS, Gannon FH, Deely D, O'Hara BJ. Percutaneous skeletal aspiration and core biopsy: complementary techniques. Am J Roentgen 1996;166(2):4415-8.

13. Horowitz SM, Rubin DA, Dalinka MK, Gannon FH. Knee pain in a 28-year-old man. Clin Orth Rel Res 1994;309:274-8.

14. Horowitz SM, Rubin DA, Dalinka MK, Gannon FH. Hip pain in a 24-year-old woman. Clin Orth Rel Res 1995;312:

15. Van Leersum M, Schweitzer ME, Gannon FH, Finkel GC, Mitchell DG. Thickness of articular cartilage by MRI: accuracy, sequence comparison, reproducibility, and inter-observer variation. Skel Rad 1995;24(6):431-5.

16. Schweitzer ME, Beavis K, Deely DM, Gannon FH. Does the use of lidocaine affect the culture of percutaneous bone biopsy specimens obtained to diagnose osteomyelitis? An in vitro and in vivo study. Am J Rad 1995;164:1201-3.

17. Schwartz GF, Carter DL, Conant EF, Gannon FH, Finkel GC, Feig SA. Mammographically detected breast cancer: Nonpalpable is not a synonym for inconsequential. Cancer 1994;73:1660-5.

18. White LM, Schweitzer ME, Deely DM, Gannon FH. The utility of combined histologic and microbiologic evaluation of percutaneous biopsy samples in the investigation of osteomyelitis. Radiology 1995;197(3):840-2.

19. Shafritz A, Janoff H, Gannon FH, Shore E, Sutton L, Connor JM, Zasloff M, Kaplan FS. Craniopharyngioma in a child with fibrodysplasia ossificans progressiva. J Bone Min Res 1995;9:429

20. Horowitz SM, Uri SD, Dalinka MK, Gannon FH. Knee pain in a 34-year-old woman. Clin Orth Rel Res 1995;316:284-8.

21. Horowitz SM, Dalinka MK, Gannon FH. Knee pain in a 30-year-old male. Clin Orth Rel Res 1996;322:293-6.

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23. Shafritz AB, Shore EM, Gannon FH, Zasloff MA, Taub R, Muenke M, Kaplan FS. Over-expression of an osteogenic morphogen in Fibrodysplasia Ossificans Progressiva. New Eng J Med 1996;335:555-61.

24. Gannon FH, Kaplan FS, Olmsted E, Finkel GC, Zasloff M, Shore E. Differential immunostaining with Bone Morphogenetic Protein (BMP) 2/4 in early fibromatous lesions of Fibrodysplasia Ossificans Progressiva and Aggressive Juvenile Fibromatosis. Hum Pathol 1997;238-245

25. Morrison WB, Schweitzer ME, Wapner KL, Hecht PJ, Gannon FH, Behm WR. Osteomyelitis on feet of diabetics: Clinical accuracy surgical utility and cost-effectiveness of MRI imaging. Radiology 1995; 196(2):557-64.

26. Horowitz SM, Uri DS, Dalinka MK, Gannon FH. Hip pain in a 45-year-old woman. Clin Orth Rel Res 1995;319:327-29 and 331-2.

27. Wallace K, Haddad JG, Gannon FH, Esterhai J, Kaplan FS. Skeletal response to immobilization in Paget's disease of bone. Clin Orth Rel Res 1996;328:236-40.

28. Wu H, Tino G, Gannon FH, Kaiser L, Pietra GG. Lepidic intrapulmonary growth of malignant mesothelioma presenting as recurrent hydropneumothorax. Hum Pathol 1996;27:989-92.

29. van Leersum M, Schweitzer ME, Gannon F, Finkel G, Vinitski S, Mitchell DG. Chondromalacia patellae: an in vitro study. Comparison of MR criteria with histologic and macroscopic findings. Skel Rad 1996;25(8):727-32.

30. Shore EM, Gannon FH, Kaplan FS.Fibrodysplasia ossificans progressiva: why do some people have two skeletons? Revue Du Rhumatisme English Edition. 1997;64(6 Suppl):92S-97S.

31. Moriatis JM, Gannon FH, Shore EM, Bilker W, Zasloff MA, Kaplan FS. Limb swelling in patients who have fibrodysplasia ossificans progressiva. Clin Ortho Rel Res 1997;336:247-53.

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35. Gannon FH, Valentine BA, Shore EM, Zasloff MA, Kaplan FS. Acute lymphocytic infiltration in an extremely early lesion of fibrodysplasia ossificans progressiva. Clin Ortho Rel Res 1998;346:19-25.

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40. Lanchoney TF, Olmsted EA, Shore EM, Gannon FH, Rosen V, Kaplan FS. Characterization of bone morphogenetic protein-4 receptors in Fibrodysplasia Ossificans Progressiva. Clin Orth Rel Res 1998;346:26-37.

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42. Gannon FH, Kaplan FS, Shore EM, Zasloff M, Epstein F. Recombinant human bone morphogenetic protein-2 (BMP-2) stimulates a dermal osteogenic wound response in the skate but not in the shark: An early vertebrate clue to the formation of a dermal exoskeleton in children with Progressive Osseous Heteroplasia. Bull Mount Desert Island Biol Lab 1997;36:14-16.

43. Gannon FH, Sokoloff L. Histomorphometry of the aging human patella: histologic criteria and controls. Osteoarth Cart 1999;7:173-81.

44. Chan PS, Kneeland JB, Gannon FH, Luchetti WT, Herzog RJ. Identification of the vascular and avascular zones of the human meniscus using magnetic resonance imaging: correlation with histology. Arthroscopy 1998;14:820-3.

45. Reedy BK, Pan F, Kim WS, Gannon FH, Krasinskas A, Bartlett SP. Properties of coralline hydroxyapatite and expanded polytetrafluorethylene membrane in the immature craniofacial skeleton.. Plast Reconstr Surg 1999;103:20-6.

46. Mohler ER, Chawla MK, Chang AW, Vyavaher N, Levy RJ, Graham L, Gannon FH. Identification and characterization of calcifying valve cells from human and canine aortic valves. J Heart Valve Dis 1999;8:254-60.

47. Glaser D, Gannon F, Kaplan F, McLane M, Boyle K, Zasloff M, Shore E. Characterization of the earliest stages of post-natal endochondral ossification. J. Bone Mineral Res. 12 (supplement 1): F296, August 1997.

48. Hwang PH, Montone KT, Gannon FH, Senior BA, Lanza DC, Kennedy DW. Applications of in situ hybridization techniques in the diagnosis of chronic sinusitis. Am J Rhinology 1999:13(5):335-8

49. Gadwal SR, Fanburg-Smith JC, Gannon FH, Thompson LDR. Primary chondrosarcoma of the head and neck in pediatric patients: A clinicopathologic study of 14 cases with a review of the literature. Cancer 88(9):2181-2188, May 1, 2000

50. Murphey MD, Choi JJ, Kransdorf MJ, Flemming DJ, Gannon FH. Imaging of Osteochondroma: Variants and complications with Radiologic-Pathologic correlation. Radiographics 20:1407-1434, Sept-Oct 2000

51. Silber JS, Whitfield SB, Anbari K, Vergillio J, Gannon F, Fitzgerald RH. Insidious destruction of the hip by Mycobacterium tuberculosis and why early diagnosis is critical. J Arthroplasty 2000 Apr; 15(3):392-7

52. Whyte MP, Mills BG, Reinus WR, Posgornik MN, Roodman GD, Gannon FH, Eddy MC, McAlister WH. Expansile skeletal hyperphosphatasia: a new familial metabolic bone disease. J Bone Miner Res. 2000 Dec;15(12):2330-44

53. Perloff JR, Gannon FH, Bolger WE, Montone KT, Orlandi R, Kennedy DW. Bone involvement in sinusitis: an apparent pathway for the spread of the disease. Laryngoscope 2000 Dec;110(12):2095-9

54. Yeh G, Mahtur S, Wivel A, Li M, Olmsted EA, Gannon FH, Ulied A, Audi L, Kaplan FS, Shore Eileen. GNAS1 mutation and Cbfa1 misexpression in a child with severe congenital plate-like osteoma cutis: A variant of Progressive Osseous Heteroplasia. J Bone Min Res 2000 Nov;15(11):2063-73

55. Shore EM, Glaser DL, Gannon FH. Osteogenic induction in hereditary disorders of heterotopic ossification. Clin Orthop Rel Res Clin Orthop. 2000 May; (374):303-16

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60. Gannon FH, Glaser D, Caron R, Thompson LD, Shore EM, Kaplan FS. Mast cell involvement in fibrodysplasia ossificans progressiva. Hum Pathol. 2001 Aug;32(8):842-8.

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66. Garcia RE, Gannon FH, Thompson LD. Dedifferentiated chondrosarcomas of the larynx: a report of two cases and review of the literature. Laryngoscope. 2002 Jun;112(6):1015-8.

67. Kirschner RE, Karmacharya J, Ong G, Gordon AD, Hunenko O, Losee JE, Gannon FH, Bartlett SP. Repair

of the immature craniofacial skeleton with a calcium phosphate cement: quantitative assessment of craniofacial growth. Ann Plast Surg. 2002 Jul;49(1):33-8;

68. Thompson LD, Gannon FH. Chondrosarcoma of the larynx: a clinicopathologic study of 111 cases with a review of the literature. Am J Surg Pathol. 2002 Jul;26(7):836-51.

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73. Gugala Z, Olmsted-Davis EA, Gannon FH, Lindsey RW, Davis AR. Osteoinduction by ex vivo adenovirus-mediated BMP2 delivery is independent of cell type. Gene Ther. 2003 Aug;10(16):1289-96.

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1. Kaplan FS Gannon FH. Paget's disease of bone. In Principles of Orthopedic Practice Roger Dee Ed. McGraw Hill 1997

2. Kaplan FS Wagman RB Gannon FH Zasloff MA Shore E. Progressive Osseous Heteroplasia: A guidebook for families.

3. Kaplan FS Delatycki M Gannon FH Rogers JG Smith R Shore EM. Fibrodysplasia Ossificans Progressiva. In Inherited neuromuscular disorders: Recent advances and future prospects. Alan E. Emery Ed. Wiley 1998

4. Kaplan FS Shore EM Gannon FH Zasloff MA. The candidate gene approach to a rare genetic disease of skeletal malformations and ectopic osteogenesis in humans. Joseph A. Buckwalter et. al. Eds. American Academy of Orthopedic Surgeons 1998

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7. Head and Neck Pathology Thompson L, MD, series editor
Chapters authored by Francis H. Gannon, MD: Osteosarcoma, Otosclerosis, Chordoma, Cementoblastoma, Gout and Pseudogout, Osteoblastoma, Chondrosarcoma, Cherubism, Synovial Chondromatosis, Chondrosarcoma, Osteoradionecrosis, Osteoma, Otitis Media, Exostosis, Osteomyelitis, Fibrous dysplasia, Ossifying fibroma, Juvenile active ossifying fibroma, Fibrosarcoma, Paget's disease

Publications in preparation

Online Publications

Emedicine Pathology Thomas Wheeler, MD, series editor

Chapters to include: Introduction to bone pathology, Chondrocytes, Osteoblasts, Osteoclasts, Osteocytes, Osteomyelitis, Histiocytosis, Syphilis, Tuberculosis, Sarcoid, Fungal infections, Fracture healing, Stress fracture, Cortical desmoids, Myositis ossificans, Heterotopic ossification, Subungual exostosis, Osteoid osteoma, Rheumatoid arthritis, Osteoarthritis, Collagen vascular diseases, Coupling/Uncoupling of cellular mechanisms, Regulation of calcium and phosphate, Parathyroid hormone, Parathyroid hormone related protein, Vitamin D, Calcitonin, Primary hyperparathyroidism, Renal osteodystrophy, Osteoporosis, Rickets, Gout, Ochronosis, Storage diseases, Avascular necrosis, Legg-calves-perthes disease, Osteochondritis dissecans, Neuropathic joints, Leprosy, Paget's disease, Osteogenesis imperfecta, Osteopetrosis , Achondroplasia, Osteochondroma, Enchondroma, Melorheostosis, Fibrous dysplasia, Fibroxanthoma, Ossifying fibroma, Angioma, Unicameral bone cyst, Pigmented villonodular synovitis, Giant cell tumor of tendon sheath, Synovial chondromatosis, Ganglion, Ewings sarcoma, Lymphoma, Plasma cell lesions, Hodgkins disease, Fibrosarcoma, Leiomyosarcoma, Osteosarcoma, Chondrosarcoma, Parosteal sarcomas, Angiosarcoma, Metastatic tumors, Giant cell tumors, Chondroblastoma, Chondromyxoid fibroma, Osteoblastoma, Hemangioendothelioma, Adamantinoma, Synovial sarcoma, Lipoma, Liposarcoma, Neurofibroma, Chordoma

Grant Support

Active

DARPA (Heggeness) 9/01/08 – 08/31/14 2.4 calendar
DARPA $2,037,548/1st Yr
Use Of Bioresorbable Hydrogels And Genetic Engineering To Accomplish Rapid Stabilization And Healing In Segmental Long Bone Defects

Awards and Other Achievements

Participated in the BBC documentary "The Skeleton Key" on FOP patients which was awarded :
Wellcome Trust Award for Best Science and Medical Documentary 1999
Royal Television Society Award for Best Documentary 1999
International Image and Science Festival Grand Prize for Best Science Documentary Worldwide 1999
Association of British Science Writers Award for Best Science Documentary

Employee of the year, GS13 and above, AFIP, 2000

Meritorius Civilian Service Award, Feb 2003

-Awarded for performing autopsies and assisting the investigation of the Challenger shuttle disaster.

Commander's award for Civilian service April 2005

-Awarded for overseeing the medical digitization effort at the Armed Forces Institute of Pathology. The effort included overseeing $80 million in Congressional money over 4 years, Serving as the Contract Officer Technical Representative, and coordinating the efforts of 400+ employees in 3 states.

Superior Civilian Service Award Feb 2007

-Awarded for assisting in the development of the new body armor that the military has fielded (first fielded in Kosovo). This new body armor has resulted in the saving of thousands of lives. The award resulted in a television interview and report by KHOU TV Houston.

Fullbright and Jaworski award for teaching excellence, August 2010

Baylor College of Medicine Top 5 Teacher award as selected by the graduating class of BCM 2014, 2015